REMARKS

Applicant has amended the claims in order to more particularly define the invention taking into consideration the outstanding Official Action. Claims 3, 6 and 7 have been amended in an effort to overcome the rejection under 35 USC 112. Applicants most respectfully submit that all the claims now present in the application are in full compliance with 35 U.S.C. §112 and are clearly patentable over the references of record.

The rejection of claims 3, 6 and 7 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which application regards as the invention has been carefully considered but is most respectfully traversed.

The Official Action states that the recitations "densely culturing" and "densely cultured" render the claims indefinite because the term "densely" is a relative term, whose metes and bounds are unclear. It is believed that this is a term of art and would be fully understood by one of ordinary skill in the art to which the invention pertains. In an effort to meet this rejection, Applicants have amended claims 3, 6 and 7 by replacing the terms "densely culturing" and "densely cultured" with "enrichment cultured" to more clearly define the invention. It is believed that this term is supported by the specification in the discussion of densely cultured and the like as used in the specification. See for example, the discussion on page 9 of Applicants' specification and one of ordinary skill in the art would appreciated that this description is enrichment cultured. Therefore, it is believed that this obviates the rejection and it is most respectfully requested that this rejection be withdrawn.

The rejection of claims 1, 3-5 and 7under 35 U.S.C. §102(b) as being anticipated by Kim et al. and in the alternative the rejection of claims 1-7 under 35 U.S.C. 103(a) as being unpatentable over Kim et al. has been carefully considered but is most respectfully traversed.

In addition, the provisional rejection of claim 6 on the grounds of obviousness type double patenting over the claims of copending application 10/030,153 has been carefully considered but is most respectfully traversed. It is noted that this is a provisional rejection as no claims have been indicated to be allowable in either case. Therefore there is no need to file a terminal disclaimer. Moreover, it is believed that the claimed subject matter in both applications are patentably distinct, that is unobvious over each other.

Applicant wishes to direct the Examiner's attention to MPEP § 2131 which states that to anticipate a claim, the reference must teach every element of the claim.

> "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed.Cir. 1990).

Applicants wish to direct the Examiner's attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP § 2143. This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Applicants also most respectfully direct the Examiner's attention to MPEP § 2144.08 (page 2100-114) wherein it is stated that Office personnel should consider all rebuttal argument and evidence presented by applicant and the citation of In re Soni for error in not considering evidence presented in the specification.

The presently claimed invention is novel and unobvious over the prior art and the claimed subject matter of the copending application as would be appreciated by one of ordinary skill in the art to which the invention pertains.

The presently claimed subject matter is prima facie different from EP 0827 229A2, entitled "Biofuel cell without electron transfer mediator" (hereinafter, referred to as Cited reference 1) and US 10/030,153, entitled "A biofuel cell using wastewater and activated sludge for wastewater treatment" (hereinafter, referred to as Cited reference 2).

Cited reference 1 relates to a microbial fuel cell using separately cultured metal salt-reducing bacteria (e.g. *Shewanella putrefaciens* IR-1 and AJ-2) without an electron transfer mediator. The contents of this patent are limited to the extent that predetermined bacteria are previously cultured and then added to the microbial fuel cell to generate electric power, and thus this patent differs significantly from the presently claimed invention which is electrochemical enrichment of electrochemically active bacteria (EAB) having a variety of unspecified microbial community and a biosensor for analyzing BOD using the same.

Cited reference 2 relates to wastewater treatment using a microbial fuel cell, and is not totally associated with and different from determination of organic substances and BOD in water (the present invention) and wastewater treatment (Cited invention 2).

The present claimed invention, and Cited references 1 and 2 all use the microbial fuel cells and are inventions employing the same.

Meanwhile, "enrichment culture" (not dense culture) used in the present invention is a technical microbiology term and means a technique involving increasing only the number of desired microorganisms by establishing growth conditions (herein, an anode of the microbial fuel cell) such that specific microorganisms (herein, EAB) can be selectively proliferated, while growth of undesired microorganisms is controlled. Accordingly, this enrichment technique is a new bioelectrochemical technique different from the method of driving the fuel cell used in Cited reference 1 in which the previously cultured microorganisms are added and then the microbial fuel cell is operated.

Specifically, the anode used in Cited reference 1 is employed as an electron sinker, while the anode in the present invention serves as an electron acceptor for selective enrichment of EAB, thus changing an initially low concentration of EAB to a high concentration after a predetermined period of time. In the case of Cited reference 1, the microorganisms separately added to the microbial fuel cell have a short life, and thus the fuel cell utilizing such microorganisms can utilize only particular organic substances as fuels and suitable operation time of the fuel cell is about 1 day. Unlike Cited reference 1, the microbial fuel cell in accordance with the present invention has characteristics capable of operating for prolonged periods of more than 6 months using various kinds of wastewater. Further, in determining the amount of organic substances, it is impossible to determine the amount of organic substances using the microbial fuel cell having a short service life of about 1 to 2 days in a practical sense (Cited invention 1). In contrast, the presently claimed invention provides a novel method capable of stably operating the microbial fuel cell for more than 6 months, and thereby it is possible to determine BOD through this method. In conclusion, the present invention is an advanced and improved device in which a constitution similar to Cited invention 1 is practically applied but the claimed invention is neither anticipated or render obvious to one of ordinary skill in the art based on this teaching.

Meanwhile, Cited reference 2 relates to a wastewater treatment device using a microbial fuel cell and is an invention that utilizes characteristics of anaerobic respiratory EAB and thus replaces an insoluble electron acceptor used for bacterial metabolism and growth with the anode of the microbial fuel cell, thereby inducing reduction of activated sludge occurring in general wastewater treatment. In this connection, specifically, since general aerobic bacteria used in wastewater treatment catabolically metabolize organic substances to reduce oxygen and utilize energy generated from decomposition of the organic substances for their growth, addition of a predetermined amount of oxygen and organic substances to a wastewater tank under predetermined conditions induces increased biomass of bacteria (producing what is referred to as activated sludge). Meanwhile, because the EAB enrichment cultured in the microbial fuel cell catabolically metabolize organic substances under anaerobic conditions and donate electrons to the electrode, they generate less energy than under aerobic conditions and when this energy is used for bacterial growth, bacteria also show relatively low growth. Therefore, the present invention is a novel invention capable of reducing the problems such as occurrence and treatment amount of activated sludge exhibited by conventional wastewater treatment facilities, when using the microbial fuel cell, and therefore Cited reference 2 has no relation to Cited reference 1 and the presently claimed invention. Accordingly, it is most respectfully requested that these rejections be withdrawn.

Applicants note the Examiner's comments with respect to the Information Disclosure Statement filed January 24, 2002 in which the copies were not legible and were not received in the PCT application. Accordingly, Applicants enclose the copies of the references and the Form 1449 listing each of the references cited in the international search report which it is believed contains English language comments on the relevancy of the references listed in the A category as background information. The Examiner is respectfully requested to return an initialed and dated copy of the attached Form PTO-1449 to confirm that all publications listed thereon have been considered and made officially of record in the file of this application.

In view of the above comments and further amendments to the claims, favorable reconsideration and allowance of all of the claims now present in the application are most respectfully requested.

Respectfully submitted,

BACON & THOMAS, PLLC

By: Richard E. Fichter
Richard E. Fichter
Registration No. 26,382

625 Slaters Lane, 4th Fl.
Alexandria, Virginia 22314
Phone: (703) 683-0500
Facsimile: (703) 683-1080

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